What is claimed is:

1. A film-forming apparatus, which comprises a gas-mixing chamber for admixing a raw gas and a reactive gas, a film-forming chamber connected to the gas-mixing chamber, a shower head disposed on the top face of the film-forming chamber and a stage arranged in the film-forming chamber for placing a substrate to be processed and capable of freely going up and down and in which a gas mixture prepared in the gas-mixing chamber is introduced into the film-forming chamber through the shower head to thus form a film on the substrate, the apparatus being characterized in that the gas mixture prepared in the gas-mixing chamber is supplied to the shower head through a supply port disposed at the peripheral portion on the bottom face of the gas-mixing chamber so that the gas mixture prepared in the gas-mixing chamber and fed to the shower head through the peripheral portion on the top face of the shower head flows towards the central portion of the shower head.

2. The film-forming apparatus as set forth in claim 1, wherein an exhaust port for discharging the exhaust gas from the film-forming chamber is disposed on the side wall of the film-forming chamber and below the level of the stage upon the film-formation so that the exhaust gas generated in the film-forming chamber is directed and guided towards the side wall of the chamber and discharged through the exhaust port arranged on the side wall.

3. The film-forming apparatus as set forth in claim 1 or 2, wherein when the flow rate of the gas mixture is large, the shower conductance is small and the gas mixture is injected into the film-forming chamber from the central portion of the shower head (hereunder referred to as "central gas injection") upon the formation of a film, the apparatus is so designed that it comprises a shower head having a large diameter, that the distance between the shower head and the substrate to be processed is increased or that a shower head having a large diameter is used and the distance between the shower head and the substrate to be processed is increased, to thus prevent the central gas injection of the gas mixture and to make the manner of a gas injection of the gas mixture uniform.

4. The film-forming apparatus as set forth in claim 1 or 2, wherein when the flow rate of the gas mixture is small, the shower conductance is large and the gas mixture is injected into the film-forming chamber from a shower head and into a region above a substrate to be processed from the periphery of the shower head (hereunder referred to as "peripheral gas injection") upon the formation of a film, the apparatus is so designed that it comprises a shower head having a small diameter, that the distance between the shower head and the substrate to be processed is reduced or that a shower head having a small diameter is used and the distance between the shower head and the substrate to be processed is reduced, to thus prevent the peripheral gas injection of the gas mixture and to make the manner of the gas injection of the gas mixture uniform.

5. The film-forming apparatus as set forth in any one of claims 1 to 4, wherein the apparatus is so designed that the inner diameter of the film-forming chamber and the diameter of the shower head satisfy the following relation:

(The diameter of the shower head) × 1.5 ≤ (The inner diameter of the film-forming chamber) ≤ (The diameter of the shower head) × 2.5.

6. The film-forming apparatus as set forth in claim 5, wherein the relation holds true when the pressure in the film-forming chamber, the diameter of the shower head and the overall flow rate of gases upon the formation of the film satisfy the following relations, respectively:

2 Torr < (The pressure in the film-forming chamber) < 10 Torr

The diameter of the substrate to be processed ≤ (The diameter of the shower head) × 1.5.

2500 sccm < (The overall flow rate of gases) < 7000 sccm.

7. The film-forming apparatus as set forth in any one of claims 1 to 6, wherein the apparatus is so designed that the distance between the shower head (S) and the substrate (S) to be processed (S/S distance) satisfies the following relation:

(S/S distance) × 5 ≤ (The diameter of the shower head) ≤ (S/S distance) × 10.

8. The film-forming apparatus as set forth in claim 7, wherein the relation holds true when the pressure in the film-forming chamber, the diameter of the shower

head and the overall flow rate of gases upon the formation of the film satisfy the following relations, respectively:

2 Torr < (The pressure in the film-forming chamber) < 10 Torr

The diameter of the substrate to be processed ≤ (The diameter of the shower head) × 1.5

2500 sccm < (The overall flow rate of the gases) < 7000 sccm.

9. The film-forming apparatus as set forth in any one of claims 1 to 8, wherein the clearance for exhaustion of this apparatus satisfies the relation represented by the following equation:

0.02 m^3/s < Exhaustion Conductance < 0.08 m^3/s.

10. The film-forming apparatus as set forth in claim 9, wherein the equation holds true when the pressure in the film-forming chamber, the diameter of the shower head and the overall flow rate of gases upon the formation of the film satisfy the following relations, respectively:

2 Torr < (The pressure in the film-forming chamber) < 10 Torr

The diameter of the substrate to be processed ≤ (The diameter of the shower head) × 1.5

2500 sccm < (The overall flow rate of the gases) < 7000 sccm.

11. The film-forming apparatus as set forth in any one of claims 1 to 10, wherein a gas ring is disposed at the periphery of the top face of the film-forming chamber so that an inert gas, which is not directly involved in the film formation, can uniformly be introduced into the film-forming chamber through the gas ring and along the inner wall surface of the film-forming chamber.

12. The film-forming apparatus as set forth in any one of claims 1 to 11, wherein the film-forming apparatus is one according to MOCVD.

13. A film-forming apparatus, which comprises a load-lock chamber for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber; a conveyer chamber positioned between the load-lock chamber and the film-forming chamber; a gas-mixing chamber for admixing a raw gas and a reactive gas positioned on the upstream side of the film-forming chamber; a

shower head arranged on the top face of the film-forming chamber; and a stage arranged in the film-forming chamber for placing a substrate to be processed and capable of freely going up and down, in which a gas mixture prepared in the gas-mixing chamber is introduced into the film-forming chamber through the shower head to thus form a film on the substrate and the apparatus being characterized in that it is so designed that it can satisfy the requirements as set forth in any one of claims 1 to 12.